

## CLAIMS

1. A polar-axis telescope incorporated in an equatorial telescope comprising:

an objective lens that forms an object image;

5 a focal plate that is arranged on a focal plane of said objective lens;

an eyepiece that is arranged backward of said focal plate and forms an observed image;

a zoom optical system that is arranged between said  
10 objective lens and said eyepiece, and that makes the observed image appear gradually bigger while maintaining an in-focus situation; and

a zoom optical system driver that shifts said zoom optical system along a polar-axis, corresponding to an optical axis  
15 of said polar-axis telescope, so as to change a magnification.

2. The polar-axis telescope of claim 1, wherein said zoom optical system is arranged between said focal plate and said eyepiece, and relays the object image formed on said focal plate to said eyepiece.

20

3. The polar-axis telescope of claim 2, wherein said zoom optical system driver comprises a cam mechanism that comprises a cam tube, a guiding tube arranged coaxial to said cam tube, and a cam follower connected to said cam tube and said guiding  
25 tube, said cam mechanism shifting said zoom optical system

along the polar-axis in accordance with a rotation of said cam tube.

4. The polar-axis telescope of claim 3, further comprising a scale ring that is operatively connected to said guiding tube and that is rotatable around the polar-axis relative to said cam tube, to adjust a position of a scale formed on said focal plate;

wherein said focal plate is operatively connected to said guiding tube, and rotates around the polar-axis by rotating said scale ring so as to set the scale to a position corresponding to a present observed time.

5. The polar-axis telescope of claim 3, wherein said eyepiece is operatively connected to said guiding tube such that said eyepiece does not rotate in accordance with the rotation of said cam tube;

6. The polar-axis telescope of claim 3, further comprising a zoom operation member that rotates said cam tube in accordance with an operation of said zoom operation member;

7. The polar-axis telescope of claim 6, wherein said zoom operation member is ring-shaped and is arranged adjacent to said eyepiece relative to said zoom optical system.

8. The polar-axis telescope of claim 6, further comprising a spacer that is arranged between said guiding tube and said cam tube to adjust a position of said cam tube along the polar-axis relative to said guiding tube.

9. The polar-axis telescope of claim 6, further comprising a nut that engages with an outer surface of said guiding tube, and that is arranged backward of said zoom operation member so as to press said zoom operation ring, said nut being screwed to adjust a rotation-resistance of said zoom operation ring.

10. The polar-axis telescope of claim 2, wherein said zoom optical system driver comprises:

a cam tube that accommodates said zoom optical system, and has a moving channel formed on said cam tube;

10 a guide tube that is coaxially arranged around said cam tube, and that has a guiding channel that guides said zoom optical system along a polar-axis, said cam tube being rotatable around the polar-axis relative to said guiding tube, said guiding tube being held so as not to rotate while said cam tube rotates; and

15 a cam follower that is operatively connected to said zoom optical system and that transmits the rotation-motion of said cam tube to said guide ring.

11. The polar-axis telescope of claim 10, wherein said guiding channel is formed along the polar-axis, said moving channel being formed in a slant direction with respect to the polar-axis so as to draw a helical line around said polar-axis, said cam follower moving along the guiding channel.

12. The polar-axis telescope of claim 1, wherein said zoom optical system comprises an erecting optical system.

13. The polar-axis telescope of claim 1, wherein said zoom optical system comprises a condenser lens, a first zoom lens, and a second zoom lens, said first and second zoom lens moving along the polar-axis.

5 14. The polar-axis telescope of claim 1, wherein said zoom optical system comprises a relay optical system.

15. An equatorial telescope mount comprising:

a polar-axis telescope that comprises an objective lens, a focal plate, and an eyepiece for forming an observed image;

10 a polar-axis outer tube that adjusts the azimuth and altitude of said polar-axis telescope;

a polar-axis inner tube that is provided in said polar-axis outer tube and that is rotatable around the polar-axis relative to said polar-axis outer tube, said  
15 polar-axis telescope being installed in said polar-axis inner tube; and

a declination outer tube that is operatively connected to said polar-axis inner tube and that is rotatable around the polar-axis relative to said polar-axis outer tube;

20 wherein said polar-axis telescope comprises:

a zoom optical system that is arranged between said objective lens and said eyepiece, and that makes the observed image appear gradually bigger while maintaining an in-focus situation; and

25 a zoom optical system driver that shifts said zoom optical

system along a polar-axis, corresponding to an optical axis  
of said polar-axis telescope, so as to change a magnification.